

Northwest Indian Fisheries Commission

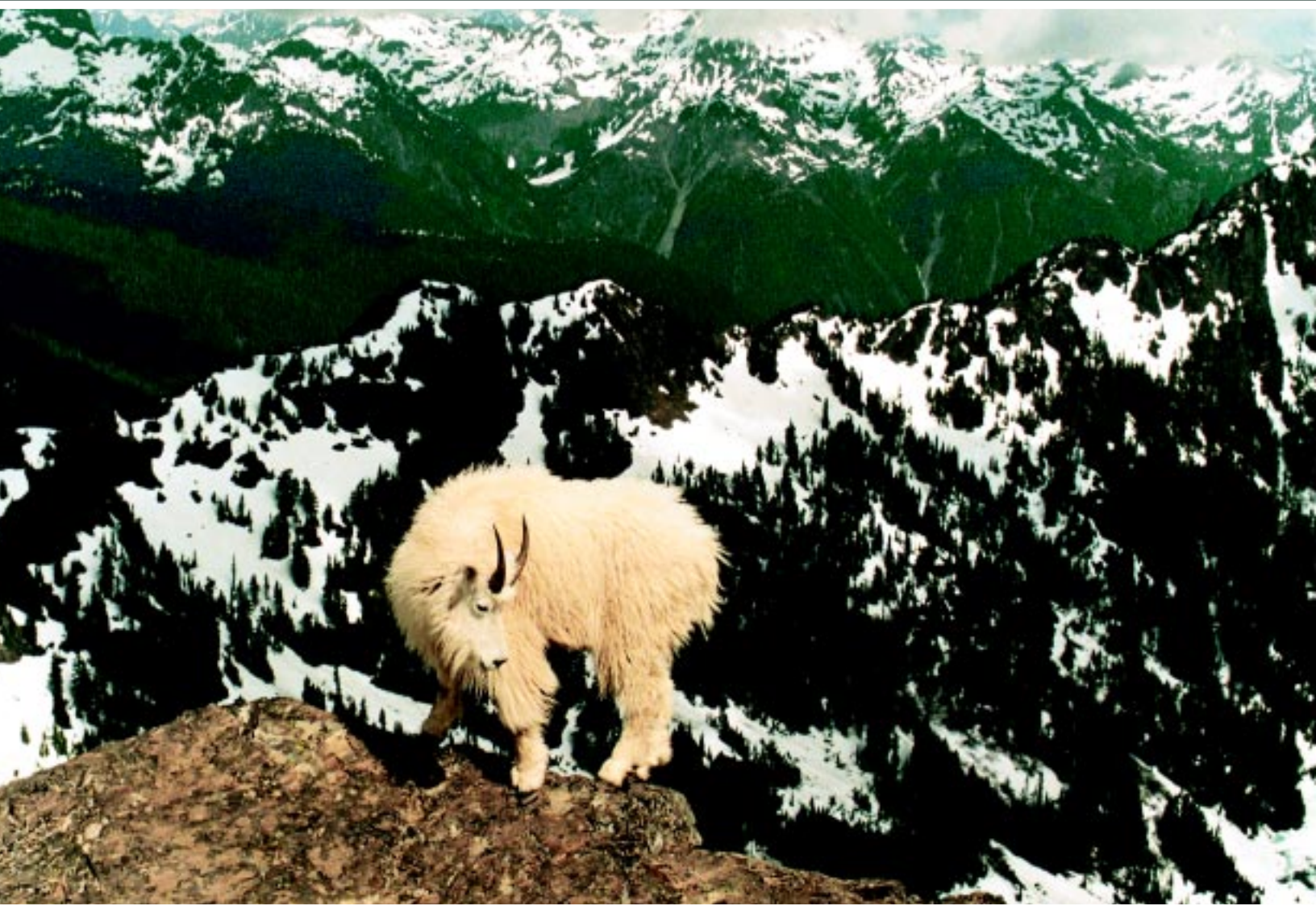
NEWS



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Inside:

- Dungeness Cooperation Pays Off
- Understanding Drought, Wetlands
- Protecting Marbled Murrelets
- Log Jams Enhance Habitat
- Study Helps Mountain Goats
- Small Streams Still Important

The Drought Continues

By Billy Frank Jr.
NWIFC Chairman

There are those who say the drought is over. But look toward the horizons and you know that can't be true.

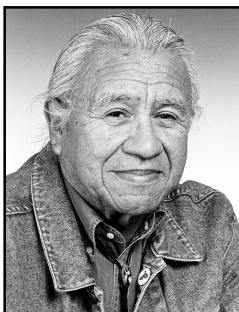
There is no snow in the mountains. Even the mighty Mt. Tahoma is uncommonly dry, her glaciers melting faster than ever.

Elsewhere, the rivers are running low. Dried up in some spots. Salmon struggling to find suitable spawning habitat at the completion of their incredible journeys are all too often failing in their quest.

Even more dismaying is that these conditions, abnormal for years gone by, may well be common in the years to come.

Believe me, the drought most certainly goes on – and it's important for you to know it. How else can you be expected to make good choices regarding use of this precious resource? Why else should you turn off your spigots, or demand accountability from your elected officials? Yes, the drought goes on.

There is a drought in political credibility, too. Your elected officials have been anything but accountable with respect to water management for many, many years.



Earlier this year the Governor, the Legislature and the State Department of Ecology patted each other on the back for passing HB 1832, calling it the most meaningful water legislation in 20 years. Yet, it basically shifted water accountability to local, ill-conceived conservancy boards and made it easier for agri-business to pull still more water out of the already parched streams. This year, the Governor says the primary objective is to balance the needs of fish with the expanding water requirements of the growing human population. In a recent meeting with him, the tribes were told that the Puget Sound region will grow by another million people over the next ten years and there must be water to accommodate them.

There apparently also is a drought in logic. Once the million people are here, each of them making new and expanded demands on a water resource that is already wavering, what's to be done about the million or more to come in the decade following that? And the one after that?

Obviously, people need water. Without it, they die. Their need for healthy salmon runs may not be so evident, but the fact remains that it's real. People need fish. It's a fact of nature. You may not catch fish and you may not even eat fish, but you need them all the same.

Salmon are what some scientists refer to as a keystone species. That means they are fundamental to the health

Continued, Next Page

On The Cover: The Sauk-Suiattle Tribe is working to restore populations of the majestic North Cascades Mountain Goat, which occupies a special place in the tribe's culture. See story on Page 8. *Photo: D. Preston*

Northwest Indian Fisheries Commission News

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Years Of Cooperation Pay Off On Dungeness

The Dungeness River is suffering from the worst drought in over two decades. Depressed runs of salmon, including the endangered Puget Sound chinook and Hood Canal summer chum, struggle to find suitable habitat in continually lower water levels. Local irrigators need to find water to wet their crops.

In another place, these elements – drought, endangered fish and farmers – would be cause for heightened tensions. But, because of the foresight of local residents over the past decade, water is not a source of bitter animosity between these neighbors.

“We’re fortunate that everyone with an interest in the Dungeness River was able to get together and decide to do what is best for the community and the river,” said Ann Seiter, natural resources director of the Jamestown S’Klallam Tribe, whose traditional fishing area is centered on the Dungeness watershed. “In years like this, when water really is a rare resource, we see the years of cooperation paying off.”

In addition to the tribe – which has an interest in restoring historic salmon runs on the Dungeness – anglers, irrigators, riverside property owners, local conservation groups and state and local governments all worked together in the early '90s, under the Dungeness/Quilcene Water Resource Pilot Project,

to resolve competing water use issues.

One result of this was the creation of the Dungeness River Management Team, where all users have a seat at the table. Another result was the agreement between the tribe and the irrigators that if the water levels in the river were low, the irrigators would willingly cut back on consumption. “This agreement between the Jamestown S’Klallam Tribe and the irrigators association is a key-stone of this cooperation and trust in the valley,” said Seiter. “When we started talking, we realized that no one group should bear the brunt of conserving water, that we should all share the pain.”

“While we still get to take some water out of the river, we lessen the amount so salmon have enough water to spawn and rear in,” said Mike Jeldness, the coordinator for the Dungeness River Agriculture Water User Association. “We’ve made much more progress working together and leaving the lawyers out of it.”

Since 1995 the irrigators have reduced by a third their water use in the critical salmon spawning months of August and September. Also, the state has granted the irrigators a “Trust Water Rights Agreement” so that their conservation efforts do not result in loss of their legal water rights. The irrigators and the tribe have also agreed

to find ways to more efficiently use the water they take from the Dungeness River. With the help of the tribe, money has been found to pay for lining of irrigation channels to prevent water seepage and fish screens have been placed on head gates, preventing young salmon from being drawn down irrigation ditches.

“The people in this valley show that it’s very possible for salmon and farmers to coexist,” said Jeldness.

– E. O’Connell

Being Frank —

Continued From Page 2

and vitality of all other life in the Pacific Northwest. They provide nutrition for all living things. The health of salmon is also a direct reflection of the health of your environment. Deny it as much as you want, you need a healthy environment and a strong natural resource base to survive.

So, when it becomes more and more evident that water is a finite resource—as it is in the Northwest during this drought year—it becomes even more important for us all to look into the future and realize that we must respect the little we have.

Want to talk legal rights pertaining to water? The law couldn’t be more clear—first in time, first in use. No one comes close to outranking the tribes in this regard. And the primary use of the tribal water right is instream flows. In effect, salmon are the senior water users in the Pacific Northwest. The day may well come when the tribes will have to force that issue in a legal manner, and government will have no choice but to protect instream flows as people are forced to face reality and make more efficient use of the water they have.

For now, let’s focus on the drought. And let’s find ways to work together to restore a flow of common sense to Pacific Northwest.

Dungeness River Fast Facts

- The Dungeness River supports chinook, chum, pink, coho and steelhead runs.
- There has been no directed tribal fishing for Dungeness pink or chinook salmon since 1974 and no tribal fishery on hatchery steelhead for more than a decade.
- Pink and chinook salmon prefer a flow of 180 cubic feet per second in the river. Instream flows of less than 100 cfs are harmful to salmon because oxygen levels drop and temperatures rise. Currently, flow of the Dungeness is 170 cfs. Normal flows for early September are 185 cfs.

Drought Adds To Knowledge Of Wetlands

Two tribes are taking advantage of the dry summer to get a close look at exactly how a rare wetland reacts to drought conditions. The Suquamish and Port Gamble S'Klallam tribes will be studying the Keokuk Wetland, the headwaters of salmon bearing streams that are of vital importance to both tribes.

As this year's drought in the Northwest progresses into the fall, staff from both tribes will be monitoring water levels on Keokuk and the two creeks it feeds. Sam Snyder Creek flows south through the Suquamish Reservation into Liberty Bay and Port Gamble Creek flows north from the wetland into Port Gamble Bay. Both support several species of salmon, including chum, coho and cutthroat trout.

One of the mysteries surrounding Keokuk is how long it will retain water as the dry months drag on. Since Keokuk behaves like a sponge, water seeps slowly into Sam Snyder and Port Gamble creeks. Dave Fuller, water resources manager for the Port Gamble S'Klallam Tribe, and Art Schick, water resources manager for the Suquamish Tribe, expect continued flows out of Keokuk for at least some time into the driest weeks of the summer. But after the summer is over, they hope to know exactly how long Keokuk can hold water before going dry.

The situation is complicated further because only a short portion of Sam Snyder Creek is available as spawning habitat due to a fish-blocking culvert under State Highway 305. "Lower water levels are going to mean less access for fish coming back this year," said Schick. "We have a piece of habitat in great condition here, but fish can't use it."



Ray Ives, water resources technician with the Suquamish Tribe, tests oxygen levels at the Keokuk wetlands. *Photo: E.O'Connell*

Western Washington treaty Indian tribes, including the Suquamish and Port Gamble S'Klallam, filed suit in February to compel the State of Washington to repair the culvert blocking Sam Snyder Creek and hundreds of similar culverts in western Washington.

According to a 1997 report by the state departments of Transportation and Fish and Wildlife, barriers to fish passage at road culverts are "one of the most recurrent and correctable obstacles to healthy salmonid populations in Washington." – *E. O'Connell*



Teaming Up For Chum

The Nisqually Tribe and U.S. Army personnel at Fort Lewis have teamed up build a 940-foot spawning channel for chum salmon near Muck Creek, a tributary to the Nisqually River. The tribe provided \$17,000 for spawning gravel and other materials for the project, with labor donated by the Army. The Nisqually River system supports one of the largest runs of winter chum salmon in Puget Sound. *Photo: T. Meyer*

Makah Tribe Protects Marbled Murrelet Habitat

The Makah Tribe has set aside 278 pristine acres of rapidly disappearing marbled murrelet habitat in the Waatch River Valley.

The set-aside was acquired as part of the Tenyo Maru oil spill settlement. The Tenyo Maru sank July 22, 1991 after being rammed by a Chinese grain ship, spilling 100,000 gallons of fuel oil. The oil fouled the coast of the Makah Indian Reservation and as far south as Destruction Island, 40 miles away. Thousands of sea birds died as a result of the spill.

"It's estimated we lost 7 to 11 percent of the marbled murrelet population on the coast as a result of the spill," said Rob McCoy, wildlife biologist for the Makah Tribe. The marbled murrelet is considered threatened under the Endangered Species Act. The robin-sized sea bird survives as an adroit fisher, but nests up to 50 miles inland in old-growth trees. The murrelet's decline has been linked to dwindling old growth forests and the nesting habitat they provide.

That kind of critical nesting habitat is found in the Makah conservation easement purchased with \$1.4 million from a fund established to address some of the damage wrought by the oil spill.

The 287 acres has roughly 132 acres of old growth trees. The murrelet needs the dense moss that festoons old growth trees. It makes a depression in the deep carpet of moss or mistletoe, laying a single egg.

The remaining acreage acts as a nesting buffer for the murrelets, as well as reducing silt loads in the Waatch River. Reducing silt in the river helps keep important offshore kelp beds in the ocean healthier. High silt loads kill the kelp beds important to a variety of sea life, including young fish hiding from predators while they grow. The kelp beds sustained heavy damage from the Tenyo Maru oil spill.

The set-aside only prohibits timber harvest. "We're still going to be able to use that area as we always have for collecting plants, ceremonies and hunting," said Gordon Smith, vice chairman of the Makah Tribal Council. — *D. Preston*



Marbled Murrelet in winter plumage.

Marbled Murrelet Fast Facts

- The marbled murrelet is about the same size as a robin. Its range in North America extends from the Pacific Northwest Coast to the Bering Sea.
- Marbled murrelets live for up to 25 years. They nest in old growth tree stands up to 50 miles inland. Females lay a solitary egg.
- Marbled murrelets can fly up to 60 mph. Their call is a gull-like *keer-keer*.

Small Trees, Bushes Important To Salmon

It's been well-established that trees are crucial to quality salmon habitat. What's less well known, however, is that other vegetation – small trees and bushes known as "scrub shrub" vegetation – are essential, too, especially in tidal marshes.

Greg Hood, a restoration ecologist with the Skagit System Cooperative, is using old aerial photographs of the region and field work to examine the sustainability of marsh habitat in the Skagit Basin.

"The more we can learn about the Skagit River, the more effectively we can protect it in the future," said Hood.

One of the focuses of Hood's work is the importance of this "scrub shrub" vegetation – especially Sweet Gale, a nitrogen-fixing estuarine shrub.

These shrubs are valuable because, as a nitrogen-rich food source, they provide nutrients for herbivores in the system. Completing the cycle of life, when the herbivores die, they become food for fish in the system.

Besides directly helping preserve ecosystems in this way, scrub shrub brush provides valuable benefits for beavers in estuaries. In scrub-shrub habitat, beavers will build smaller dams – creating ponds of only a few

feet deep – that becomes a refuge for juvenile salmon.

This habitat is particularly valuable because it comes at a key time in a fish's life: in marshes, young salmon are preparing to head out to sea. Additionally, these smaller ponds provide habitat that larger fish and great blue heron have no access to - these animals cannot break through the smaller shrubs - and thus prevents predation on juvenile fish.

Unfortunately, less than six percent of the historical vegetation of this type remains in the Skagit River delta.

— *J. Shaw*

Tribes Employ Logjams To Enhance



A salmon rests near a logjam on the Nooksack River. *Photo: E. O'Connell*

Creating better salmon habitat through the use of log jams is the goal of two projects by western Washington treaty Indian tribes that are making substantial contributions to wild salmon recovery efforts.

Nestled along the South Fork of the Nooksack River are some of the most beautiful features of western Washington. Traditionally, this area was bountiful with chinook and coho salmon, along with other aquatic species.

But landslides and other environmental changes have swamped sediment into the river and generally diminished habitat diversity in the Nooksack.

Now, the Lummi Nation has completed a project that will make significant strides to address these problems. Using a combination of assessment work, long-term planning and direct habitat restoration, the tribe is working to recover fish habitat along the South Fork in the Larson's Bridge reach. Completed this summer, phase one of the project saw six engineered logjams installed in the river, helping create more diverse and higher quality habitat for chinook and coho.

"Preserving salmon populations along this stretch of the Nooksack River benefits everyone," said Merle Jefferson, director of Lummi Natural Resources. "It will take projects of this scale to help bring back the salmon, and Lummi Nation is committed to making those projects happen."

Why is the Larson's Bridge reach, near Nooksack River Mile 20, particularly important? There are several reasons.

- Landslides in the area contain particularly fine sediment. This poses special danger to salmon reproduction, because sediment of this size smothers salmon eggs.
- Adult salmon use pools with tree cover as "holding habitat"—places to rest and feed. Before this project began, there were no pools with tree cover in the reach. Salmon generally spawn near their holding habitat.
- Logjams are a key element of habitat recovery for this reach. Historically, logjams provided structure to the channels in the South Fork. Early accounts of the region

describe logjams that were miles long. The current project seeks to re-create these conditions, which served salmon so well over the years. Additionally, the jams will disperse river flow across the flood plain, increasing the amount of habitat available to salmon.

"By placing these logjams in strategic sites, we'll help salmon get the right size gravel they need to spawn," said Michael Maudlin, geologist with Lummi Nation.

Through a variety of techniques, including spawning surveys and beach seining surveys of juvenile fish, natural resources workers will be able to see just what is occurring for fish in this stretch of the Nooksack River. The monitoring, which will continue for five years, also includes sediment characterization and surveying.

Completion of the logjam project is already showing benefits to fish by creating pools for holding habitat.

"We're always looking to do more for fish habitat," says Gregg Dunphy, Lummi Nation enhancement manager. "We plan on carefully monitoring the project site so we can create the best possible river stretch for salmon to spawn and rear their young in."

Over on the Olympic Peninsula, just days after large pieces of wood were carefully placed in the South Fork of the Pysht River, juvenile fish are obviously taking advantage of the

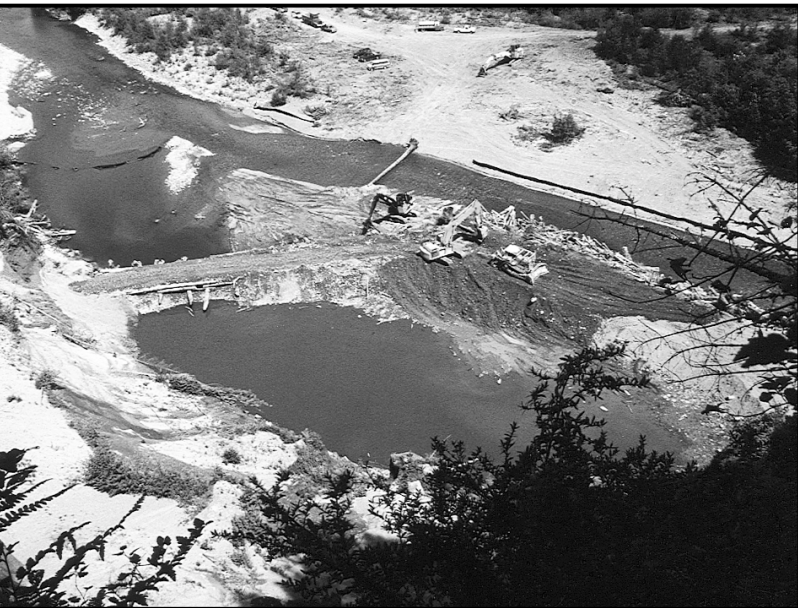


A view from the largest logjam



Field crews from the Lower Elwha Klallam Tribe work on a logjam project on the Elwha River. *Photo: E. O'Connell*

Salmon Habitat



The top of a major landslide shows construction of the Lummi Nation's reach on the Larson's bridge reach of the Nooksack River. *Photo: J. Shaw*

shade and shelter they provide. Young coho and steelhead dart in and out of the shadows cast by these logs that will help restore damaged habitat on both the Pysht and Elwha Rivers.

"These things are like fish magnets; you put them in one day and the next day, the fish are right there," said Jim Bolstrom, senior restoration technician with the Lower Elwha Klallam Tribe. "It seems like these fish can't wait until we put these logs in."

The Lower Elwha Klallam Tribe is placing over 30 large logs, along with hundreds of smaller pieces of timber, in the two rivers to fashion complex logjams that are no longer present within either river system. "Because most of the large conifers like those being used for the project have been removed, there aren't enough for natural recruitment on many rivers on the Olympic Peninsula to help create salmon habitat," said Mike McHenry, habitat biologist for the Lower Elwha Klallam Tribe.

The project on the South Fork Pysht River is being done in conjunction with the local landowner, Merrill & Ring, who is providing material for both projects.

"By acting cooperatively with local landowners, we are on the track to restore habitat and salmon runs on the Strait of Juan de Fuca," said McHenry. "The more projects like this we complete, the closer we are to recovering these vital salmon stocks." – *J. Shaw & E. O'Connell*

Quileute Tribe Makes Shuwah Tributaries Hospitable For Salmon

Two nameless tributaries of the Shuwah River northeast of Forks will once again be hospitable for fish following the completion of a habitat restoration project by the Quileute Tribe.

A crew of five tribal members performed the physically demanding task of cutting and clearing wood and debris blocking the flow of the two tributaries that has thwarted fish use of the streams. The project is being funded by a \$64,000 Jobs In the Woods grant.

"A lot of trees in these old riparian management zones (streamside areas) have blown down and clogged up the streams," said Adam Kowalski, Timber/Fish/Wildlife biologist for the Quileute Tribe. "Wood in a stream is usually a good thing, but in this case, we have a lot of random, single trees falling and just blocking the stream rather than helping to create nice pools. Our crew is removing those and we are creating appropriate structures to pool water in different areas, but with places for fish to get past those structures," said Kowalski.

The project, being done in cooperation with landowner Rayonier Inc., is part of an overall plan to restore and improve fish habitat in the Sol Duc River basin.

"Every piece of good fish habitat is important," said Mel Moon, Quileute Natural Resources director. – *D. Preston*



Adam Kowalski, Timber/Fish/Wildlife biologist for the Quileute Tribe, stands near a section of an unnamed tributary of the Shuwah River that tribal crews have cleared for use by salmon and trout. *Photo: D. Preston*

Tribe Works To Save Mountain Goats

The Sauk-Suiattle Tribe has completed a landmark study on the North Cascades Mountain Goat, an animal that is central to the small tribe's culture.

The five-day study, which concluded July 28, saw a five-person team fly into the Glacier Peak Wilderness in the Mount Baker-Snoqualmie National Forest by helicopter and live among the goats. The \$3000 study was funded by the Sauk-Suiattle Tribe, with the participants volunteering their time.

"Since time immemorial, the Sauk-Suiattle tribe and the mountain goat have had a unique cultural relationship," said Norma Joseph, chair of the tribe. "This study will help us preserve this magnificent creature's survival."

Over the last several decades, the once-plentiful goat herds have dwindled to perhaps as few as 60.

"For the tribe, these goats are like their church," said Shari Brewer, the tribe's cultural and natural resource coordinator. Brewer, tribal staff and volunteers undertook the five-day study in an effort to determine what is causing the rapid decline of the remarkable creature.

Historically, the Sauk-Suiattle people hunted goat for survival, drying the meat for use during winter and weaving clothing from the animal's wool. A representation of the goat can be seen today on top of the tribal crest.

Among some of the factors the tribe wished to investigate: habitat destruction, where logging has eliminated much of the winter refuges for the goats; parasites, which may be decreasing the health of the herds; and nutritional needs of animals.

"Preserving the environment is crucial to preserving the goat," said Joseph. "If we can provide a healthy habitat for these animals, we can get them on the road to recovery."

To help bolster the flagging populations, the Sauk-Suiattle Tribe stopped their ancient tradition of hunting the goat 20 years ago. The State of Washington prohibited hunting the goats in 1995.

Besides preserving habitat, the tribe has been vocal about preventing disease among the goats. In the 1980s, a fecal sample collected from a goat revealed lungworms, a parasite which can cause fatal pneumonia. No study attempted to ascertain the extent of disease among goats until this one. Depending on the results, the tribe may want to consider placing medicated salt blocks in the North Cascades for the goats.

"We're committed to doing whatever we can to solve the threats facing the North Cascades Mountain Goat," said Joseph. "Since before history began, the tribe has lived in harmony with the goat. We want that to continue forever." — *J. Shaw*



Successful reproduction is necessary if mountain goat populations in the North Cascades are to recover.

Photo: D. Preston

Auto Salvage Yard Planned For Important Cultural Site

Stillaguamish tribal leaders are protesting a controversial auto storage and recycling yard slated for south Arlington. The location upon which the yard may be built is the site of a historic and significant warrior village and burial ground, according to Ed Goodridge, Sr., chair of the Stillaguamish Tribal Council.

"The tribe is concerned because this is an extremely important cultural site," said Goodridge, whose grandfather's grandparents are buried on the site. "The land is sacred to the tribe, and we want to stop potential desecration of this crucial area."

Historically, the village was where warriors would meet before a hunt or a battle. The site was used to defend the inner village of the Stillaguamish Tribe from attack. It is believed that a community of approximately 300 tribal people once occupied the property and surrounding areas.

Tribal officials have requested that the City of Arlington withhold the permit for the facility. If development occurs, Stillaguamish tribal leaders are concerned that human remains and historic artifacts could be damaged, destroyed or otherwise disturbed.

The 40-acre facility would be operated by Copart, a nationwide auto recycler, and would be built on former farmland. — *J. Shaw*

Genetic Study Eyes White River Chinook

One stock or two?

That's the question that tribal fishery managers are trying to answer about naturally spawning chinook salmon in the upper White River system, where chinook begin returning in mid-May, and continue throughout the summer and early fall.

As recently as 1995, genetic analysis of a small sample of chinook returning to the river system indicated that all of the fish were of a single spring stock. But in 1998, advances in genetic analysis allowed researchers to take a closer look at the genetic makeup of the fish. The result: What was thought to be one run of chinook might actually be two.

Tribal and state fishery managers are trying to determine if chinook returning to the river system are spring-run fish that just happen to return to the river system over a long period of time, or whether the later returning fish are actually a separate stock of fall-run chinook. To do that, the Muckleshoot and Puyallup tribes, along with the Washington Department of Fish and Wildlife, are gathering tissue samples from returning naturally spawning chinook each week during the summer and early fall.

Logging, urbanization, dams and other factors have all contributed to the decline of chinook in the White River system. Since the 1940s, the U.S. Army Corps of Engineers has trapped upriver bound chinook at Puget Sound Energy's low head diversion dam on the river and trucked them above the larger Mud Mountain flood control dam to continue their spawning run.

Chinook returns continued to dwindle until the Muckleshoot Tribe's White River Hatchery opened in 1989. The hatchery was built by Puget Sound Energy as part of an out-of-court settlement over water-use litigation filed by the tribe.

Throughout the summer, tribal fisheries personnel gather daily at the fish

trap just below the diversion dam to obtain information from the returning naturally spawning chinook, and to sort out fish returning to the tribe's hatchery. Scale samples are taken to determine the age composition of the run, and a

snippet of tissue is collected from a fin for genetic analysis before the naturally spawning chinook are hauled upriver to continue their migration. Samples will be gathered from 200 of the returning chinook to determine the accuracy of the 1998 genetic analysis that indicated two separate runs of chinook

inhabit the river system.

Information gathered from the study is critical to future management of chinook in the White River system, according to the tribe, whose goal is to restore White River salmon populations to healthy, productive and harvestable levels. — *T. Meyer*



Puyallup tribal biologist Chris Phinney holds a White River chinook while Muckleshoot tribal biologist Richard Johnson scans for a tiny metal coded wire tag to determine if the fish is wild, or of hatchery origin. *Photo: T. Meyer*



Long Reach

Six-year-old Issac Martinez leans over a rope to improve his chances of landing a fish at the Keta Creek Fishing Derby, held several times each year at the Muckleshoot Tribe's Keta Creek Hatchery near Auburn. The summer derby is a favorite of families, who land upwards of 3,000 trout in a few hours. Participants can win prizes in a variety of categories. *Photo: T. Meyer*

Even Streams With No Fish Crucial To Salmon Recovery

Though many small streams in Washington watersheds don't produce salmon themselves, protecting those tiny bodies of water might be key to preserving the streams and rivers that do contain fish.

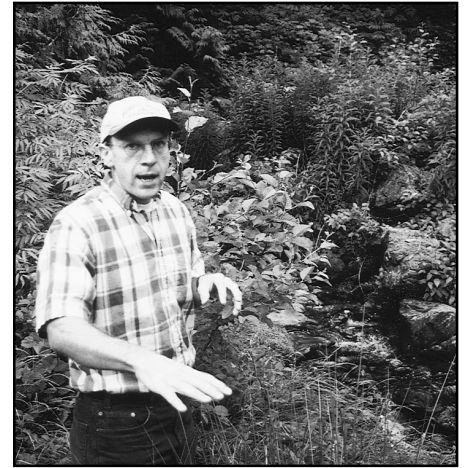
New research by the Skagit System Cooperative, the natural resources consortium of the Upper Skagit, Sauk-Suiattle and Swinomish tribes, is helping solidify the science of protecting these streams. As part of implementing Washington's Forests and Fish report process, researchers are surveying non-fish bearing streams - and gathering information essential to protecting the ecosystems they flow through.

"For every mile of fish-bearing stream that exists, there are many miles of non-fish bearing stream that serve crucially important functions," said

Curt Veldhuisen, a hydrologist with SSC. "Even though these streams may not produce fish, they perform important services to salmon habitat, such as controlling sediment flow through a river system."

Under previous state forest practices, no tree-lined buffers were mandated for streams that did not produce fish. Subsequently, under more recent FFR practices, non-fish bearing streams are divided into two categories: those that have uninterrupted flow throughout the year, and those that do not. The streams with perennial flow - being more crucial to fish habitat - would receive greater protections.

How do researchers determine which streams have perennial flow? That involves good old-fashioned field research, and Skagit Systems Coopera-



Curt Veldhuisen, Skagit System Cooperative hydrologist, is studying non-fish bearing streams to help preserve salmon habitat. *Photo: J. Shaw*

tive staff are leading the way. After surveying about 100 streams - beginning with the Stillaguamish drainage system and proceeding north throughout the Skagit basin - SSC researchers were able to gather valuable stream data.

That data may provide a scientific basis for greater protection of these non-fish bearing streams. Currently, FFR processes consider a stream "perennial" if the stream's basin size is greater than 52 acres for the vast majority of western Washington locations. Veldhuisen's research shows, however, that perennial streams in the Skagit Basin exist with much smaller basin size. Their numbers suggest that streams should be designated perennial - and afforded greater protections - starting at a basin size of 21 acres.

"The number gives us a tool to determine which streams are perennial and which streams aren't," said Veldhuisen. "That, in turn, helps us answer other scientific questions."

The preliminary findings of the SSC team will be incorporated with new data from this year and next year in an attempt to comprehensively answer those and other questions. The current numbers suggest that existing protections are insufficient to preserve non fish-bearing streams, Veldhuisen said.

"There's a big difference between 52 and 21," he noted. - *J. Shaw*



'Home For Sacred Belongings'

A 500-year-old cedar fishing net is among the items that will be displayed in a new museum dedicated recently by the Squaxin Island Tribe. The museum, located on the tribe's reservation near Shelton, is scheduled to open its doors to the public next spring. Many of the items were excavated from an ancient fishing village on Mud Bay near Olympia. *Photo: T. Meyer*

Makah Projects

Target Lake Ozette

Sockeye Recovery

Fall visitors to Lake Ozette on the North Olympic Peninsula may see a small boat with a strange antennae array and high tech equipment plying the waters.

It isn't a new kind of boat speed trap, but a part of the Makah Tribe's long-term, comprehensive approach to sockeye salmon recovery. The tribe is pursuing more knowledge of Lake Ozette sockeye, a threatened species, in hopes of improving the numbers of returning fish.

The boat is tracking 100 adult sockeye that were surgically implanted with a combined acoustic and radio transmitter tag. Last year, the tribe tracked 29 sockeye in a pilot project. The expansion to 100 fish is significant in that it will provide a substantial amount of data on the habits and life history characteristic of adult sockeye in Lake Ozette.

"With these tags, we can more effectively follow the fish to determine what happens to them," said Mike Crewson, fisheries biologist for the Makah Tribe. The fish were implanted in late spring and will be tracked for the rest of the year.

"These projects are just a part of our overall sockeye program. We'll also be conducting a study that will try to determine if the lake level has changed over the years," said Crewson. Rapidly fluctuating lake levels may be partially

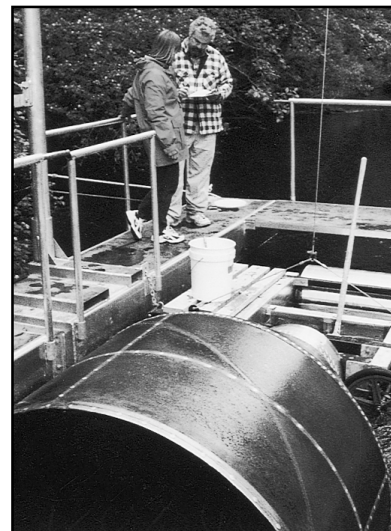
responsible for eliminating some of the spawning beaches.

A separate, but related study was the operation a rotary screw trap on the Ozette River from April through mid-July.

The use of the screw trap for a number of springs to come will allow the tribe to:

- More accurately estimate how many young salmon, both hatchery and wild, survive their time in the lake prior to beginning their new life in the ocean;
- Estimate the numbers of smolts, or young salmon, produced by each spawning adult;
- Compare differences and similarities in run timing and size among hatchery and wild smolts; and
- Estimate annual survival rates and trends in productivity of both hatchery fish and wild fish.

"We're concerned about both wild fish and hatchery fish. The information generated by these projects will help us answer specific questions we have about sockeye behavior and survival rates," said Crewson. — *D. Preston*



Makah fisheries biologist Mike Crewson and NWIFC salmon biologist Sandra Zeiner check data on the numbers and types of fish passing through the screw trap on the Ozette River.

Photo: D. Preston

Quinalts Enhance Blueback Populations

The blueback or sockeye salmon has been synonymous with the Quinault Indian Nation (QIN) for thousands of years.

While all salmon are important to the QIN, recent efforts to enhance the populations of Lake Quinault/Quinault River sockeye using state-of-the art management techniques are particularly important given the blueback's place in tribal culture.

In June, the QIN released more than 1 million juvenile sockeye into the Lake Quinault watershed north of Aberdeen. Three groups of fish were released; each to test a different supplementation approach.

Most were released directly into the lake, while nearly 150,000 fry were released into a tributary stream. A small group (89,650) of those released in the lake were zero-age smolts. These fish were reared from egg to smolt size

in less than a year. This was done by feeding the fry as often as they would eat, allowing them to attain release size in less than six months. These fish should return in two years, rather than the normal three years for sockeye.

The June release was important for a number of reasons, including improved odds for survival, said Ed Johnstone, QIN council member. Low water flows normally experienced in July make it more difficult for young fish to survive because water temperatures are higher and shallow water provides fewer places for young fish to hide from predators.

Biologists will measure and compare the rates of adult returns from the different groups to help determine the best supplementation strategy for the Quinault blueback.

— *D. Preston*

New Home For Chinook At Gorst Hatchery

Chinook salmon returning to Gorst Creek this fall will have a new home. In a restoration project spearheaded by the Suquamish Tribe and supported by several local agencies, work crews over the past few months have created a new curved channel for the creek as it runs past the Gorst Creek Hatchery, making that stretch more habitable for spawning and migrating salmon.

"This is really an incredible project, not only because it restores a great piece of habitat, but because of the number of people that have gotten involved," said Paul Dorn, the salmon enhancement program manager for the Suquamish Tribe.

When the current fish hatchery was built on Gorst Creek in 1918, the creek was straightened into a concrete channel. Baffles were also added to attempt to slow the water's speed. Unfortunately, these changes caused rising temperatures in the stream and high water velocities, which made fish survival difficult. The concrete channel eliminated any spawning area that could be used by wild salmon. "By putting curves back in the creek and by planting vegetation, we create a much better place for the fish to be," Dorn said.

The old design of the creek channel wasn't deliberately or neglectfully intended to harm salmon runs. "Good intentions were always here. At the time, straight channels with baffles were thought to be the best thing for fish," said Dorn.



Before and after: The lower portion of Gorst Creek has been restored to a more natural state (right), eliminating a straight raceway (left) that hampered salmon passage and spawning. *Photos: E O'Connell*

Currently, the tribe annually releases more than 2 million chinook salmon from the Gorst Hatchery. In addition to chinook produced at the hatchery, stocks of coho and chum salmon spawn naturally in Gorst Creek.

Gorst Creek originates west of Bremerton in the Kitsap Peninsula and flows into Sinclair Inlet to the east. The Gorst Creek restoration project involves the lower 20 percent of the stream. "Most damage is usually done to streams near their

mouths," Dorn said. "This is also a very sensitive area and an important place where good habitat is needed, because all the fish in the system use the area."

"Another great plus for this project is that the upper watershed of this system is relatively unscarred by logging or land development," said Dorn.

The Suquamish Tribe's partners on the project include the Washington Department of Fish and Wildlife, which owns the Gorst Hatchery, and the City of Bremerton, which is providing administrative support to the project and owns the land around the creek. The tribe has operated the hatchery for the state since 1980. The restoration project is being conducted through a grant to the Suquamish Tribe from the state Salmon Recovery Funding Board and federal Pacific Coast Salmon Recovery funding. – *E. O'Connell*

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